APPENDIX A

SUMMARY OF REVISIONS TO DRAFT STANDARDS AND GUIDELINES

BASED ON MWPACC ENGINEERING AND PLANNING SUBCOMMITTEE INPUT

Standard/Guideline Title & Description of Subcommittee Decision for October 21, 2002 Working Draft	Implementation of Standard/Guideline on Pilot Projects and Lessons Learned	Proposed Revisions Based on Lessons Learned from Pilot Projects June 9, 2004	Subcommittee Input and Final Decision October 19, 2004
PS–1: Storm Drainage Connections to the Sanitary Sewer Conclusion for Working Draft ACCEPTABLE as standard.	• Storm drainage connections to the sanitary sewer are only acceptable under special circumstances, such as runoff collected from areas subject to high pollutant loading.	No revisions proposed.	No changes made to October 21, 2002 Working Draft Standard.
PS-2: Design Capacity for Pipeline Rehabilitation Projects Conclusion for Working Draft ACCEPTABLE as standard.	• Pilot project designs did not include rehabilitation methods that would result in significant loss in hydraulic capacity, such as for a slip-lining project.	No revisions proposed.	No changes made to October 21, 2002 Working Draft Standard.
PS-3: Visual Inspection of Manholes for SSES Investigations Conclusion for Working Draft ACCEPTABLE as guideline.	• Significant sources of I/I can be missed if manhole inspections are performed during dry periods when groundwater levels are low.	• Recommend inspection during the wet season. "Wet season" to be defined as December 1st through February 28th. • Added inspection components to the investigation.	• Keep as guideline – Local Agencies do not want mandate; want to retain original MWPAAC Committee's decisions. • Include "Surface visual inspection of

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		• Revise from a guideline to a standard.	manhole is acceptable unless I/I is apparent" or similar language.
PS-4: Closed Circuit Television (CCTV) Inspection of Sewers for SSES Investigations Conclusion for Working Draft ACCEPTABLE as guideline.	• Significant sources of I/I can be missed if CCTV inspection of pipelines is performed during dry periods.	• Recommend inspection during peak of the wet season. "Wet season" to be defined as December 1st through February 28th. • Revise from a guideline to a standard.	• Keep as guideline • Add recommendation of CCTV during saturated conditions. • Add classification for severity of I/I from a given leak.
PS-5: Smoke Testing for SSES Investigations Conclusion for Working Draft ACCEPTABLE as guideline.	• Guideline applied during SSES investigations for pilot projects. No significant problems encountered.	No revisions proposed.	No changes made to October 21, 2002 Working Draft Guideline.
PS-6: Dye Testing for SSES Investigations Conclusion for Working Draft ACCEPTABLE as guideline.	• Guideline applied during SSES investigations on several pilot projects. Appropriate agencies need to be notified of dye testing.	• Require notification of impending testing to the appropriate agencies.	Proposed change accepted.
PS-7: Modeling and Engineering Analysis Conclusion for Working Draft ACCEPTABLE as guideline.	• Modeling of local agency sewer system not performed as part of the pilot project design.	No revisions proposed.	No changes made to October 21, 2002 Working Draft Guideline.
PUB-1: Connections to Existing System Conclusion for Working Draft ACCEPTABLE as standard.	• Connection of new system to existing sewer system not included in pilot projects.	No revisions proposed.	No changes made to October 21, 2002 Working Draft Standard.
PUB-2: Sewers on Steep Slopes Conclusion for Working Draft ACCEPTABLE as standard.	• No sewers on steep slopes included in pilot projects.	No revisions proposed.	No changes made to October 21, 2002 Working Draft Standard.

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PUB-3: Manhole Location and Covers Conclusion for Working Draft ACCEPTABLE as standard.	• Manhole modifications included in multiple pilot projects where the cover was subject to channelized stormwater flows and potential inundation.	No revisions proposed.	No changes made to October 21, 2002 Working Draft Standard.
PUB-4: Manhole Size Conclusion for Working Draft ACCEPTABLE as standard.	• New manholes installed as part of pilot projects followed standard spacing protocol between knockouts in accordance with WSDOT/APWA standards.	No revisions proposed.	No changes made to October 21, 2002 Working Draft Standard.
PUB-5: Manhole Joints Conclusion for Working Draft ACCEPTABLE as standard.	• Standard for manhole joints implemented where new manholes installed as part of pilot projects.	No revisions proposed.	No changes made to October 21, 2002 Working Draft Standard.
PUB-6: Side Sewer Connection Location & Taps Conclusion for Working Draft ACCEPTABLE as standard.	• Standard applied on pilot projects without any significant problems. Connections to high density polyethylene (HDPE) mains not addressed in the standard.	• Added requirement that taps to HDPE sewer mains to be made with a welded saddle connection.	• Other adequate means of making the connection to HDPE besides a welded connection are available. Delete the requirement. • Revise "…protrude" sentence (4th bullet) to address hammer taps specifically OR to adhere to Local Agency requirements.
PUB-7: Sewer System Design Conclusion for Working Draft ACCEPTABLE as standard.	• All pilot projects designed and stamped by licensed civil engineer.	No revisions proposed.	No changes made to October 21, 2002 Working Draft Standard.
PUB-8: Abandonment	• No abandonment of mains	No revisions proposed.	No changes made to October

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Requirements Conclusion for Working Draft ACCEPTABLE as standard.	or manholes implemented as part of the pilot projects.		21, 2002 Working Draft Standard.
PUB-9: Pipe Rehabilitation Methods Conclusion for Working Draft ACCEPTABLE as guideline.	• Standard referenced the "Green Book" Standard Specifications for Public Work Construction for pipe bursting, CIPP lining and fold and form. Specifications for these rehabilitation methods were developed and implemented during design of the pilot projects. Lessons learned during the construction were incorporated into a set of Guide Specifications for these rehabilitation methods. • Numerous storm drain connections to side sewers were discovered during the course of pipe bursting work on private property. • Reinstated lateral connections on CIPP projects were found to have substantial I/I unless they were grouted or lined.	• Require pipe bursting, CIPP lining, and folded/formed liners to meet the requirements of King County Regional Inflow and Infiltration Control Program Guide Specifications. • Require disconnection of any storm drain to sewer system connections discovered during the course of pipe bursting work. • Added requirement that service connections on lined mains need be made watertight by grouting lining or installing a service connection rehabilitation liner. • Deleted requirements to spray on lining for rehabilitation of large diameter pipe since it will rarely be used. • Revise from a guideline to a standard.	• Keep as guideline. • Guide specifications should require a ball test. • Move 2nd bullet under Pipe Bursting elsewhere. • Consider rewrite, or changing opening paragraph.
PUB-10: Manhole Rehabilitation Conclusion for Working Draft ACCEPTABLE as guideline.	• Specifications for manhole rehabilitation, including chemical grouting, spray on coatings and cure-in-place	• Require chemical grouting, spray on coatings and cure-in-place linings for manholes to meet the requirements of King County	• Keep as guideline.

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	linings were developed and implemented during design of the pilot projects. Lessons learned during the construction were incorporated into a set of Guide Specifications for these manhole rehabilitation methods.	Regional Inflow and Infiltration Control Program Guide Specifications. • Revise from a guideline to a standard.	
PUB-11: Spot Repairs Conclusion for Working Draft ACCEPTABLE as guideline.	• Some of the pipe repair couplings specified on the pilot projects were expensive, not readily available, or did not provide an adequate fit to the host pipe. • Spot repairs on pipes were very expensive because of the time required to mobilize and set up to perform the repair. The economy of performing a spot repair vs. rehabilitating an entire run of pipe was quickly lost if there were three or more spot repairs to perform on a run of pipe.	• Delete some of the requirements on couplings. Require repair couplings that are approved by the local agency that provide a water tight repair. • Recommend that the entire run of pipe be rehabilitated if 3 or more spot repairs are required. • Revise from a guideline to a standard.	• Keep as guideline. • For this and all standards, address cost effectiveness of different techniques if information is available.
PUB-12: Manhole Leveling Rings Conclusion for Working Draft ACCEPTABLE as standard.	• Standard was implemented on pilot projects where new manholes were installed and where rehabilitation of the leveling was required on existing manholes.	• Minor editorial revisions and delete reference to pavement patch material.	Proposed changes accepted.
PUB-13: Manhole Lids/Inserts Conclusion for Working Draft	• Standard applied on pilot projects. Manhole pans used in lieu of gasketed solid cover.	• Standard detail revised to note that manhole pans are not appropriate for use with locking	Proposed changes accepted.

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ACCEPTABLE as standard.	• Manhole pans did not work with locking frame and cover.	frame and cover.	
PUB-14: Root Intrusion Conclusion for Working Draft ACCEPTABLE as standard.	• Root intrusion in sewer mains, laterals and side sewers turned out to be significant locations of infiltration into the system in the Kent, Mercer Island and Lake Forest Park pilot projects.	• Remove the clause that I/I be removed at locations of root intrusion "if it can be done so cost effectively". • Remove paragraph referencing spot repairs. Spot repairs are addressed elsewhere in the standards.	• 1st bullet, 2nd sentence: change "it shall be removed" to "it shall be evaluated for removal during the wet season." • Drop "that have been identified through SSES" from next sentence. • Drop last bullet.
PUB-15: Pipeline Leak Testing Conclusion for Working Draft ACCEPTABLE as standard.	• Leakage in rehabilitated pipelines was not evident unless the CCTV inspection was performed during the wet season.	• Require that CCTV inspections that are performed in lieu of air or water testing be performed during the wet season. • "Wet season" to be defined as December 1st through February 28th.	• Change "shall" to "recommendation" in last bullet. • Change definition of "wet season" dates.
PUB-16: Manhole Leak Inspection Conclusion for Working Draft ACCEPTABLE as standard.	• Leakage in rehabilitated manholes was not evident unless the visual inspection was performed during the wet season.	• Require that visual inspections be performed during the wet season. • "Wet season" to be defined as December 1st through February 28th.	• Remove reference to substantial completion from first sentence. • Change to recommendation of inspection during the wet season in last sentence.
PUB-17: CCTV Inspection Conclusion for Working Draft ACCEPTABLE as standard.	• Video inspections performed on all new and rehabilitated sewer mains and laterals on the pilot projects.	No revisions proposed.	No changes made to October 21, 2002 Working Draft Standard.
PUB-18: Inspection of Pipe	• Nearly full time inspection	• Require that a minimum of	• Last bullet: change

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Installation and Backfill Conclusion for Working Draft ACCEPTABLE as standard.	performed on all the pilot projects. The inspection was critical to ensuring conformance with the specifications.	10% of the pipe length be inspected.	"shall" to "should".
PUB-19: Product Specific Inspection Conclusion for Working Draft ACCEPTABLE as standard.	• There were a number of instances on the pilot projects where field crews tried deviating from approved manufacturers' installation recommendations. Inspection was required to ensure conformance.	• Minor editorial revision proposed.	Revision accepted.
PUB-20: Certification, Warranty and Qualifications Conclusion for Working Draft ACCEPTABLE as guideline.	• Manufacturer certifications were required for rehabilitation products on the pilot projects. The requirement for certification ensured a vested interest by the product manufacturers. • Warranty requirements provided for the complete replacement of products or systems in the event of failure. • Specifications for each of the pilot projects included qualification requirements for potential bidders. These requirements helped ensure proven products were installed by contractors with the necessary qualifications.	• Minor editorial revisions. • Revise from a guideline to a standard.	• Keep as guideline. • Editorial revisions accepted.

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PRV 1: Pipe Protection-Depth of Cover Conclusion for Working Draft ACCEPTABLE as guideline.	• Damage leading to I/I was found on shallow buried pipe. Side sewers appeared to be damaged from activities such as construction of fence posts and installation of shallow utilities like gas services.	• Revise from a guideline to a standard.	• Keep as guideline.
PRV 2: Allowable Connections to Side Sewer Conclusion for Working Draft ACCEPTABLE as standard.	• Numerous storm drain connections to side sewers were discovered during the course of pipe bursting work on private property.	No revisions proposed.	No changes made to October 21, 2002 Working Draft Standard.
PRV 3: Pipe Zone Bedding and Trench Backfill Conclusion for Working Draft ACCEPTABLE as guideline.	• Aged and unsuitable pipe materials and pipe installation techniques were likely causes of I/I in the laterals and side sewers rehabilitated in Kent, Kirkland, Ronald and Skyway.	• Revise from a guideline to a standard. • Allow deviation from the standard requirements if written recommendations are provided by the pipe manufacturer.	• Keep as guideline. • Revisions accepted.
PRV 4: Pipe Materials Conclusion for Working Draft ACCEPTABLE as guideline.	• Aged and unsuitable pipe materials and pipe installation techniques were likely causes of I/I in the laterals and side sewers rehabilitated in Kent, Kirkland, Ronald and Skyway.	• Revise from a guideline to a standard.	• Keep as guideline.
PRV 5: Inspection Wyes/Cleanouts Conclusion for Working Draft ACCEPTABLE as standard. Revisit this standard when the Standard Detail(s) SS-1 and SS-3	• Cleanouts were installed on private property for each of the private property pilot projects. • Cleanouts were often strategically located to avoid	• Require cleanout placement 2 feet to 5 feet from the face of the building on new installation only. • For rehabilitation projects, require inspection wye/cleanout placement within 2 feet of the	Revisions accepted.

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are further reviewed.	damage to surface improvements such as driveways and landscaping. In some cases, the cleanouts were not installed within 5 feet of the face of the building.	termination of the rehabilitation.	
PRV-6: Lateral and Side Sewer Rehabilitation Methods Conclusion for Working Draft ACCEPTABLE as guideline.	• Standard referenced the "Green Book" Standard Specifications for Public Work Construction for pipe bursting, CIPP lining and fold and form. Specifications for these rehabilitation methods were developed and implemented during design of the pilot projects. Lessons learned during the construction were incorporated into a set of Guide Specifications for these rehabilitation methods. • Numerous storm drain connections to side sewers were discovered during the course of pipe bursting work on private property.	• Require pipe bursting, CIPP lining, and folded/formed liners to meet the requirements of King County Regional Inflow and Infiltration Control Program Guide Specifications. • Require disconnection of any storm drain to sewer connections discovered during the course of pipe bursting work. • Revise from a guideline to a standard.	• Keep as guideline. • Rewrite or move "storm drain" language (also in PUB-9).
PRV-7: Spot Repairs Conclusion for Working Draft ACCEPTABLE as standard.	• Spot repairs were not generally used for private property rehabilitation. Rehabilitation of the entire lateral/side sewer was typically more economical that a spot repair.	• Remove several of the requirements on repair clamps. Require connections be made with approved repair couplings. • Remove requirement that the entire side sewer pass a pressure test, when only a spot repair is	Revisions accepted.

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		performed.	
PRV-8: Root Intrusion Conclusion for Working Draft ACCEPTABLE as standard.	• Root intrusion in laterals and side sewers turned out to be significant locations of I/I into the system in the Kent pilot project.	• Require that rehabilitation work performed on laterals and side sewers that utilizes public resources address removal of roots and repair of the pipe at the point of root intrusion.	• Change "…shall be addressed by removal of the roots…" to "…shall be addressed by evaluating removal of the roots…"
PRV-9: Side Sewer/Lateral Leak Testing Conclusion for Working Draft ACCEPTABLE as standard.	• Requirements for an air or water test were included in the specifications on the pilot projects. • The requirements were relaxed on several pipe bursting projects after several initial successful tests because of the logistical problems of testing a pipe that needs to be placed back in service.	• Minor editorial revisions. • King County Regional Inflow and Infiltration Control Program Guide Specifications allow some testing flexibility for pipe bursting and CIPP lining rehabilitation based on the quality of the contractor's work. • The inspection for leakage shall be performed during the wet season. "Wet season" to be defined as December 1st through February 28th.	• Clarify location for CCTV testing, e.g. "CCTV from point of connection."
PRV-10: Sanitary Side Sewer Inspection Conclusion for Working Draft ACCEPTABLE as guideline.	• Open cut replacement/installation of pipe and cleanouts was inspected prior to being backfilled.	• Revise from a guideline to a standard.	• Keep as guideline.
PRV-11: Sanitary Side Sewer CCTV Requirements Conclusion for Working Draft ACCEPTABLE as standard.	• Video inspection of the connection of new and rehabilitated laterals/side sewers to the sewer main was performed on the pilot projects.	• Minor editorial revisions.	Revisions accepted.

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PRV-12: Product Specific Inspection Conclusion for Working Draft ACCEPTABLE as standard.	• There were a number of instances on the pilot projects where field crews tried deviating from approved manufacturers' installation recommendations. Inspection was required to ensure conformance.	• Minor editorial revisions.	Revisions accepted.
PRV-13: Product Specific Certification Conclusion for Working Draft ACCEPTABLE as standard.	• Manufacturer certifications were required for rehabilitation products on the pilot projects. The requirement for certification ensured a vested interest by the product manufacturers.	No revisions proposed.	No changes made to October 21, 2002 Working Draft Standard.
PRV-14: Bonding and Warranty Inspection Conclusion for Working Draft ACCEPTABLE as standard.	• Warranty requirements provided for the complete replacement of products or systems in the event of failure. • Warranty inspection of the pilot projects to be performed by the County during the 2004/05 wet season.	• Minor editorial revisions.	Revisions accepted.

Standard Detail Number & Title	Implementation of Standard Detail on Pilot Projects and Lessons Learned	Proposed Revisions	Subcommittee Input and Final Decision
SS-1: Side Sewer Installation	• Cleanouts installed on private property in conformance with Detail A/SS-4	• Remove requirement for a cleanout at the property line. • Removed reference to deleted standard at side sewer connection location.	Revisions accepted.
SS-2: Lateral Inspection Wye/Cleanout	• Cleanouts were originally required at property line on pipe bursting projects. Requirement was deleted because of the large increased cost and disruption to install the cleanout.	• Delete the detail.	Deletion accepted.
SS-3: Lateral Inspection Wye/Cleanout	• Cleanouts were originally required at property line on pipe bursting projects. Requirement was deleted because of the large increased cost and disruption to install the cleanout.	• Delete the detail.	Deletion accepted.
SS-4: Side Sewer Inspection Wye/Cleanout	• Cleanouts were often strategically located to avoid damage to surface improvements such as driveways and landscaping. In some cases, the cleanouts were not installed within 5 feet from the face of the building. • Cleanouts were buried below grade if requested by the property owner.	• Require cleanout installation within 5 feet of the building for new construction only. • For rehabilitation projects, require inspection wye/cleanout within 2 feet of the termination rehabilitation. • Allow cleanouts to be buried up to 6-inches below grade.	• Double sweep T can be wye with 45 degree angle. • Detail renumbered. Now SS-2.

Standard Detail Number & Title	Implementation of Standard Detail on Pilot Projects and Lessons Learned	Proposed Revisions	Subcommittee Input and Final Decision
SS-5: Lateral/Side Sewer Connection	• Detail used on open cut installation of laterals on Kirkland pilot project.	• Delete note requiring installation of cleanout at property line.	• Delete entire detail. After deleting cleanout at property line, the detail no longer addresses any I/I control issues.
SS-6: Vertical Lateral/Side Sewer Connection	• No vertical connections incorporated on pilot projects.	No revisions proposed.	• Detail renumbered. Now SS-3.
MH-1: Manholes─New Construction	• Detail used on several pilot projects where new manholes were installed.	No revisions proposed.	• Add note on how to deal with lifting holes (suggest sand / mortar, rather than epoxy)
MH-2: Manholes─Grade Rings and Steps	• Detail used on several pilot projects where new manholes were installed, and where frame and cover was raised to grade.	• Delete the requirement for a preformed concrete joint sealant gasket. These are not available.	Revisions accepted.
MH-3: Manholes Cover Insert	• Detail used on several pilot projects where manholes inserts were installed. • Inserts did not fit where existing manhole had a locking frame and cover.	• Add a note indicating that inserts are not appropriate for use on manholes with locking frame and cover.	Revisions accepted.
S-1: Sewer─Pipe Zone Bedding	• Detail incorporated on open cut installation of sewers and laterals.	No revisions proposed.	No changes made to October 21, 2002 Working Draft Detail.